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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/742,245	12/20/2000	Kiyoshi Oike	917-046	8059

1009 7590 02/09/2005

KING & SCHICKLI, PLLC
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EXAMINER	
MEUCCI, MICHAEL D	

ART UNIT	PAPER NUMBER
2142	

DATE MAILED: 02/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/742,245	OIKE, KIYOSHI	
	Examiner	Art Unit	
	Michael D Meucci	2142	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The abstract of the disclosure is objected to because it exceeds the 50-150 word range. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 1 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

a. Lines 24-25 of claim 1 specify: "the information is optionally and automatically distributed," which does not comply with the enablement requirement. The information cannot be optionally distributed if it is automatically distributed and vice versa. For the purpose of applying art, the examiner will presume that the information is optionally distributed, automatically distributed, or a combination of the two, wherein there exists an option to distribute the information automatically. Appropriate correction and clarification is required.

b. Lines 5-10 of the claim specify: "the registration of password is executed in an information storage box of the individual such as an original home page that has been built up on a network such as an internet, thereby creating one's own diary and one's own mail box." It is unclear as to how the registration of a password "thereby creates a diary and mailbox." The written disclosure provides no insight as to how this occurs. For the purpose of applying art, the examiner will presume that an account is set up upon password registration by intermediate steps of some form. Appropriate correction is required.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 1 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 recites the limitation "the registration" on line 5. There is insufficient antecedent basis for this limitation in the claim.

b. The phrase "such as" on line 6 and on lines 7-8 render the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

c. Lines 5-10 of the claim specify: "the registration of password is executed in an information storage box of the individual such as an original home page that has been built up on a network such as an internet, thereby creating one's own diary and one's own mail box." It is unclear as to how the registration of a password "thereby creates a diary and mailbox." The written disclosure provides no insight as to how this occurs. Appropriate correction is required.

d. Claim 1 recites the limitation "the information" on lines 13-14, line 19, line 20, and line 24. There is insufficient antecedent basis for this limitation in the claim.

e. Claim 1 recites the limitation "the designation date" on line 17. There is insufficient antecedent basis for this limitation in the claim.

f. Claim 1 recites the limitation "the recorded designation date" on line 18. There is insufficient antecedent basis for this limitation in the claim.

g. Claim 1 recites the limitation "the retrieval" on line 21. There is insufficient antecedent basis for this limitation in the claim.

h. Claim 1 recites the limitation "the designated data" on line 22. There is insufficient antecedent basis for this limitation in the claim. Examiner believes the

applicant meant to specify "the designated date" in this place, which also lacks antecedent basis in the claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-7 and 9-11 rejected under 35 U.S.C. 102(b) as being anticipated by Johnson et al. (U.S. 5,813,009) hereinafter referred to as Johnson.

a. As per claim 1, Johnson teaches: the registration on a password is executed is executed in an information storage box of the individual (lines 53-55 of column 3); creating diary and mail box relevant to the password for entering future information of short or long term (lines 63-67 of column 18 – lines 1-9 of column 19); the password is required to be input on an occasion of inputting or outputting any information thereafter (lines 49-51 of column 7); a recorded date is input in the diary and the information occurred on the recorded date is described in the column of the recorded date (lines 40-44 of column 7); a designated future distribution date is input in the mail box and the information on the designation date is described in the column of the recorded designation date (lines 47-49 of column 7 and lines 46-51 of column 20); the information thus described is transmitted to the information storage box to store the information therein (lines 47-49 of column 7 and lines 46-51 of column 20); the retrieval and distribution of information of the designated data from the information storage box is

designed to be received by the diary (lines 63-67 of column 18 – lines 1-9 of column 19); and the information is optionally and automatically distributed from the information storage box on a designated distribution day which is stored in the mail box (lines 47-49 of column 7 and lines 46-51 of column 20).

b. As per claim 2, Johnson teaches: means for storing information (lines 50-54 of column 13); diary means for inputting and retrieving information related to a specific past, present, or future date from said means for storing information (lines 32-56 of column 7); and mailbox means for inputting information related to a specific future date into said means for storing said information (lines 2-7 of column 19).

c. As per claim 3, Johnson teaches: registering a password to gain access to a means for storing information (lines 53-55 of column 3); automatically creating a diary means for inputting and retrieving information related to a specific past, present, or future date upon registration of said password (lines 53-55 of column 3 and lines 15-35 of column 30); and automatically creating a mailbox means for inputting information related to a specific future date upon registration of said password (lines 53-55 of column 3 and lines 15-35 of column 30).

d. As per claim 4, Johnson teaches: restricting subsequent access to said diary means for inputting and retrieving information related to a specific past, present, or future date and said mailbox means for inputting information related to a specific future date by use of said password (lines 56-62 of column 29).

e. As per claim 5, Johnson teaches: maintaining on a computer network said means for storing information, said diary means for inputting and retrieving information

related to a specific past, present, or future date, and said mailbox means for inputting information related to a specific future date (lines 32-56 of column 7).

f. As per claim 6, Johnson teaches: adapting said diary means for inputting and retrieving information related to a specific past, present, or future date to receive an inputted past or present date and information related specifically to said past or present date (lines 16-19 of column 12).

g. As per claim 7, Johnson teaches: said inputted past or present date and information related specifically to said past or present date are automatically stored on said means for storing information (lines 36-46 of column 1).

h. As per claim 9, Johnson teaches: adapting mailbox means for inputting information related to a specific future date to receive an inputted future date and inputted information related specifically to said future date (lines 63-67 of column 18 – lines 1-9 of column 19).

i. As per claim 10, Johnson teaches: automatically storing inputted future date and information related specifically to said future date on means for storing information (Abstract and lines 63-67 of column 18 – lines 1-9 of column 19).

j. As per claim 11, Johnson teaches: automatically outputting and displaying information related to future date on diary means for inputting and retrieving information related to past, present, or future date upon the occurrence of said future date (Abstract and lines 63-67 of column 18 – lines 1-9 of column 19).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson as applied to claim 6 above, in view of Barr et al. (U.S. 5,182,705) hereinafter referred to as Barr.

As per claim 8, Johnson does not teach: inputting said past or present date; and automatically outputting and displaying information related to said past or present date on said diary means for inputting and retrieving information related to a past, present, or future date. However, Barr discloses: "The ability to 'diary' a claim which requires subsequent activity is an integral facet of the loss adjustment process. The diary is a personal diary, determined by the operator's User ID. It has the capability to record a specified date for action on a claim, to display that claim at the appropriate time and to "rediary" as needed. When an LPT is processed, the system automatically sets the diary date for the supervisor according to Staff Table parameters. This date is predetermined based on the type of claim and the experience level of the handler but can be overridden if necessary. The diary is formatted by staff member for each day of the year on which a claim has been placed on the diary. A Diary Listing screen, shown in Table LVIII, displays all claims diaried for a specified day. The date displayed

defaults to the current date, but future diary dates can also be accessed," (lines 64-68 of column 56 - lines 1-12 of column 57).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to input said past or present date; and automatically outputting and displaying information related to said past or present date on said diary means for inputting and retrieving information related to a past, present, or future date. "The ability to "diary" a claim which requires subsequent activity is an integral facet of the loss adjustment process," (lines 64-66 of column 56 in Barr). It is for this reason that one of ordinary skill in the art at the time of the applicant's invention would have been motivated to input said past or present date; and automatically outputting and displaying information related to said past or present date on said diary means for inputting and retrieving information related to a past, present, or future date.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Levine (U.S. 4,162,610) discloses and electronic calendar and diary.

Griffin et al. (U.S. 5,303,145) discloses method and apparatus for meeting confirmation in a data processing system.

Cahill, Jr. (U.S. 5,428,784) discloses method and apparatus for linking electronic mail and an electronic calendar to provide a dynamic response to an electronic mail message.

Abbruzzese et al. (U.S. 5,557,515) discloses computerized system and method for work management and logging and diary.

Ooki et al. (U.S. 5,822,518) discloses method for accessing information and passwords.

Sankar (U.S. 5,867,822) discloses method and apparatus for management of electronic calendars throughout an enterprise and management of events in a distributed system.

Schuetze (U.S. 5,968,117) discloses device and system to facilitate accessing electronic mail from remote user-interface devices.

Van Der Meer (U.S. 6,295,639 B1) discloses securely accessing a file system of a remote server computer and displaying a diary page for a specific date.

Gough et al. (U.S. 6,360,221 B1) discloses method and apparatus for the production, delivery, and receipt of enhanced e-mail.

Heinonen et al. (U.S. 6,728,530 B1) discloses calendar-display apparatus, and associated method, for a mobile terminal.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Meucci at (703) 305-1382. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Harvey, can be reached at (703) 305-9705. The fax phone number for this Group is (703) 308-5358.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [michael.meucci@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Group receptionist whose telephone number is (703) 305-3900.

JACK B. HARVEY
SUPERVISORY PATENT EXAMINER

Notice of References Cited	Application/Control No. 09/742,245	Applicant(s)/Patent Under Reexamination OIKE, KIYOSHI	
	Examiner Michael D Meucci	Art Unit 2142	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-4,162,610	07-1979	Levine, Alfred B.	368/41
	B	US-5,182,705	01-1993	Barr et al.	705/11
	C	US-5,303,145	04-1994	Griffin et al.	705/9
	D	US-5,428,784	06-1995	Cahill, Jr., Robert B.	709/206
	E	US-5,557,515	09-1996	Abbruzzese et al.	705/9
	F	US-5,822,518	10-1998	Ooki et al.	713/201
	G	US-5,867,822	02-1999	Sankar, Sriram	705/8
	H	US-5,968,117	10-1999	Schuetze, Robert Charles	709/206
	I	US-6,295,639 B1	09-2001	Van Der Meer, Joannes Jozef Everardus	717/103
	J	US-6,360,221 B1	03-2002	Gough et al.	707/10
	K	US-6,728,530 B1	04-2004	Heinonen et al.	455/414.1
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Dawson, F.; Emerging calendaring and scheduling standards; Computer, Volume 30, Issue 12, Pages 126-128; December 1997.
	V	Cleetus, K.J.; Cascaval, G.C.; Matsuzaki, K.; PACT-a software package to manage projects and coordinate people; Enabling Technologies: Infrastructure for Collaborative Enterprises; Pages 162-169; June 1996.
	W	Stoffel, A.W.; An automated system for distributing literature and managing information overload; Aerospace Conference Proceedings, IEEE, Volume7, Pages 7-3321 - 7-3326; March 2002
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Emerging Calendaring and Scheduling Standards

Frank Dawson, Lotus Development Corp.

Calendaring and scheduling products are well established, but they have one significant drawback: They are usually limited to exchanging information among users of the same system, usually within the boundaries of a single organization. Thus you cannot use them to schedule a meeting with someone who uses a different application.

Currently, proprietary standards exist to structure some types of calendaring and scheduling information, but no single, open specification comprehensively addresses the needs of collecting and communicating information across many channels, such as phones, e-mail, and face-to-face meetings. However, important progress has been and is being made in standardizing both the format and exchange of this inherently complex information.

The group working on bringing standardization to calendaring and scheduling applications—a working group of the Internet Engineering Task Force (IETF)—is nearing the final stages in developing standards to enable different products to interoperate and to work across organizational boundaries. These standards—which include iCalendar, iTIP, iMIP, and iRIP—will be published by the end of the year.

Users will be able to communicate calendaring and scheduling information among different applications by using a variety of communication protocols.

The benefit of standardizing such interoperability is clear: Users will be able to communicate calendaring and scheduling information among different applications by using a variety of communication protocols. The applications that will benefit from these new standards include familiar mainframe products, LAN-based group scheduling products, and desktop and mobile personal information managers (PIMs).

Editor: Charles Severance, Michigan State University, Department of Computer Science, 1338 Engineering Bldg., East Lansing, MI 48824; voice (517) 353-2268; fax (517) 355-7516; crs@egr.msu.edu; http://www.egr.msu.edu/~crs

BIRTH OF THE STANDARDS

In July of 1996, an overwhelming number of the vendors that produce group schedulers, PIMs, and electronic calendars gathered together at an ad hoc industry meeting to review the need for standards.

The group identified and began to outline three key areas for the future standardization of calendaring and scheduling technology:

- *Exchange format.* Users of different applications must be able to exchange calendaring and scheduling information. The standard that is emerging will eventually permit calendar data to be exchanged using memory clipboard capabilities, drag-and-drop protocols, and computer file systems. In addition, calendar data could be attached to mail messages so that meetings can be scheduled across the Internet.
- *Interoperability protocol.* Users must be able to schedule meetings and to-dos with users of different products. For example, a user on Lotus Notes would be able to schedule a phone conference with a person using Microsoft Outlook.
- *Access protocol.* With an access protocol standard, users will be able to use a calendaring and scheduling client from one vendor with a back-end calendar service from another—for example, using a Lotus Notes client to access an electronic calendar on Microsoft Exchange.

This 1996 meeting was the catalyst that began an industrywide effort on calendaring and scheduling standards. Not only did everyone at the meeting agree that these standards were essential to the industry, but that the time was right to begin such an effort. The group also decided that the activity should be focused within the IETF, the body that drafts Internet standards. The charter for the IETF Calendaring and Scheduling (CalSch) Working Group was approved in October 1996.

CALSCH STANDARDS

The IETF CalSch Working Group decided to address all three key areas of

standardization: exchange format, interoperability protocol, and access protocol. In addition, the working group committed to drafting a standard that described the Internet model for calendaring and scheduling. This model would also outline the entire scope and application of these technologies. Significant progress has been made by the working group on completing the exchange format and the interoperability protocol.

Exchange format

iCalendar is designed for the exchange of calendar information across innumerable transports, including SMTP, HTTP, FTP, and even non-Internet transports, such as clipboard transfer, drag-and-drop, file transfer, and the IrDA infrared transport.

iCalendar is defined as the "text/calendar" MIME (Multipurpose Internet Mail Extensions) content-type for conveying calendaring and scheduling information across Internet electronic mail systems. The iCalendar standard essentially defines a container format that conveys *event*, *to-do*, *journal entry*, or even *busy time* calendar components.

- An event is a calendar component defined by a calendar date, optional time, and description. An event can be a business meeting, a telephone conference, an anniversary, or an appointment. Each event may include just a single calendar user or an entire group of users. Events can also block time to prevent potential scheduling conflicts.
- A to-do is an assignment or task for one or more users.
- A journal entry allows users to associate notes, annotations, or a complete document with a particular calendar day.
- A busy-time component captures a snapshot of scheduled events in a single format.

The iCalendar format is also used in the other CalSch Working Group standards, which include the iTIP, iMIP, and iRIP interoperability protocol standards. It will also be used within the Calendar Access Protocol (CAP) standard.

Interoperability protocol

The interoperability protocol enhances the iCalendar standard with a set of scheduling *methods*. Developers can combine methods to implement *scheduling transactions*, which means that one user can schedule an event, a to-do, or a journal entry with a user of a different calendar system.

These methods also allow you to

- schedule a calendar component with one or more users,
- reschedule a calendar component,
- reply to a request,
- cancel a calendar component,
- negotiate with the owner of a request or a counter-proposal to the request, and
- publish calendar information for widespread access.

The interoperability protocol is divided into three specifications:

An Example of iTIP Scheduling

This iTIP REQUEST method schedules an event between Frank and three other people: Steve, Alec, and Anik.

```
BEGIN:VCALENDAR
PRODID://ACME/DesktopCalendar//EN
METHOD:REQUEST
VERSION:2.0
BEGIN:VEVENT
ATTENDEE;ROLE=OWNER;STATUS=ACCEPTED;Frank@Lotus.com
ATTENDEE;RSVP=YES;EXPECT=REQUEST;TYPE=INDIVIDUAL;Steve@Netscape.com
ATTENDEE;RSVP=YES;EXPECT=REQUEST;TYPE=INDIVIDUAL;Alec@Microsoft.com
ATTENDEE;RSVP=YES;EXPECT=REQUEST;TYPE=INDIVIDUAL;Anik@OnTime.com
DTSTAMP:19970611T190000Z
DTSTART:19970701T100000-0700
DTEND:19970701T103000-0700
SUMMARY:Phone Conference
CATEGORIES:Call,IETF
UID:879970198738777-Silver-1083E1@Lotus.com
SEQUENCE:0
STATUS:CONFIRMED
END:VEVENT
END:VCALENDAR
```

The BEGIN:VCALENDAR and END:VCALENDAR lines delimit the iCalendar object, which is identified as a REQUEST method by the METHOD property. The BEGIN:VEVENT and END:VEVENT lines delimit the description of the event calendar component. The ATTENDEE properties identify both the Owner of the scheduling REQUEST, as well as the other Attendees. The event is identified as a call type of event by the CATEGORIES property. The start and end for the event are identified by the DTSTART and DTEND properties.

Every iTIP message is date/time stamped by the DTSTAMP property to assure proper sequencing by the recipient. In addition, revisions to the request are ordered by the SEQUENCE property. The UID property uniquely identifies the event, which will allow a response to be correlated with the original request. The PRODID property identifies the product that created the iCalendar object, while the VERSION property identifies the version of the iCalendar standard used to encode the object. Other information might have been added to the event description. For example, an attachment could have been specified with the ATTACH property. Contact information for the owner or the attendees could have been provided with the CONTACT property.

These iTIP methods can be conveyed in a MIME multipart/signed electronic mail message, so the recipients can authenticate Frank's identity. The methods can also be beamed among laptops using infrared technology.

- the iTIP specification, which lays out the seven iCalendar-object scheduling methods, independent of the transport protocol being used (such as e-mail or a real-time protocol);
- the iMIP specification, which binds the iTIP functions to the store-and-forward transport of Internet mail; and
- the iRIP specification, which, when written, will bind the iTIP functions to a real-time Internet protocol such as TCP or HTTP.

Whether a product uses iMIP or iRIP, users will be provided the same interoperability capabilities of iTIP. The iTIP protocol (along with either iMIP for store-and-forward connectivity or iRIP for real-time connectivity) forms the basis for future interoperability between different calendaring and scheduling products.

For More Information

Internet Engineering Task Force (IETF): http://www.ietf.org
Internet Mail Consortium: http://www.imc.org
Electronic Messaging Association: http://www.ema.org
vCalendar: http://www.imc.org/pdi/vcal-10.rtf
IETF CalSch Charter: http://www.ietf.org/html.charters/calsch-charter.html
Model document: ftp://ftp.ietf.org/internet-drafts/draft-ietf-calsch-mod-03.txt
iCalendar: ftp://ftp.ietf.org/internet-drafts/draft-ietf-calsch-ical-05.txt
iTIP: ftp://ftp.ietf.org/internet-drafts/draft-ietf-calsch-itip-02.txt

The CALSCH Working Group produced a final version of the iCalendar, iTIP, and iMIP specifications for a working group vote of acceptance in November 1997. The Request For Comment (RFC) for these drafts is expected to be published by the IETF by the end of this year.

Work on these new standards, however, will not end with the publication of the IETF RFC specifications for these drafts. Indeed, the real end for these standards—if there is an end—will be when you and I are scheduling meetings over the Internet using our favorite products. To that end, industry groups such as the Internet Mail Consortium (IMC) and the Electronic Messaging Association (EMA) plan to gather in early 1998 to test new software that supports these emerging standards.

It certainly is just about time. ❖

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An Automated System for Distributing Literature and Managing Information Overload[1]

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Abstract—A challenge in scientific communities is that one member of the community will acquire new literature but the information never gets passed on to other interested colleagues within the community. We designed and are building a web-based tool to overcome this challenge. This system is the Scientific Literature Exchange and Database System or SciExchange. SciExchange allows a scientist who reads an article, an online journal article or science news update, to log onto the SciExchange website and easily submit the article or link to the article to the database. Next, SciExchange automatically sends a notification email to the list of subscribing scientists who asked to be notified if articles on topics of interest to them were entered into the SciExchange database. The email contains a link to the article referred to. Its design, construction, planned uses, and implications for NASA's Goddard Space Flight Center (GSFC) are detailed in this paper.

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1. INTRODUCTION

Information overload is a problem so ubiquitous to modern culture that it does not require further detailing in this paper. There are probably few people in the industrialized world who haven't suffered from its deleterious effects, much less members of the scientific community who daily have to keep up with large quantities of scientific literature while performing their required research, technical and teaching duties as appropriate.

One aspect of this problem is the challenge of disseminating information within a specific scientific community such as the Space Science Directorate at NASA's Goddard Space Flight Center (GSFC). Often one member of a scientific community will come across a useful journal article, research report, or other form of information. He or she will peruse the article, making a mental note to pass it on to other colleagues within the community interested in similar topics but due to time constraints and the lack of a simple automated system to distribute such data it often takes a very long time for such literature to be distributed. This has been the case at virtually every academic, governmental, and industrial organization that I have attended and worked at over the past Thirty-Four years.

At GSFC's Space Science Directorate we designed and recently received funding to build a web-based system to overcome this challenge. The system we designed and are building is called the Scientific Literature Exchange and Database System or SciExchange. The new system is made possible by several developments. First, there has been an explosion of scientific literature available in electronic format. Many scientific peer reviewed Journals are now available on the World Wide Web (WWW). Most science news services make their announcements available on the Web at the same time as they make their other public announcement. Also, many if not most government agencies, academic institutions, and corporate entities announce new scientific and engineering results and breakthroughs on the WWW.

The other major development is the advent of powerful, free to the user, Search engines such as Google.com, Lycos.com, and many others. These Search engines allow users to harvest large quantities of information from the web with relatively simple queries. We have harnessed the power of the search engines to harvest online scientific literature by using a very powerful tool for harvesting and presenting information called WebTheme [1] [2]. WebTheme will be described in detail in the SYSTEM DESIGN section of this paper. WebTheme was developed under NASA contract by Pacific Northwest National Laboratories.

The purpose of this paper is to detail the design of SciExchange, how it functions, its planned application, and the implications for the Space Science Directorate at NASA's Goddard Space Flight Center. In conclusion I will deal with the applications of this system to other scientific

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communities and with the impact and implications that SciExchange is expected to have on the problems of information distribution and information overload in general.

2. System Design

Overview

SciExchange is made up of four primary elements. (1) The First element is an intuitive user interface. (2) The Second element is an off-the-shelf, open software, SQL database. (3) The third element is a powerful textual search and results visualization tool capable of searching material by thematic content called WebTheme [1] [2]. (4) The Fourth element is an intelligent listserv and agent based subscription service, which allows users to be notified automatically when new scientific literature they are interested in is entered into the database.

User Interface

The user interface will allow members of the Space Sciences Directorate at GSFC to accomplish several tasks, each task taking less than 5 minutes. The tasks are:

1.) Submit an article or other textual information to the SciExchange database.
2.) Search the database by subject, author, date, or other chosen parameter.
3.) Subscribe to the listserv function and Choose topics that they would like to be notified about by email when a new article is entered into the database.
4.) Initiate powerful web harvest of up to 3000 documents, which can be displayed visually on a topographic map, using a very powerful tool called WebTheme
5.) Use WebTheme to sort various sets of textual data available in electronic format, such as email.

Submit an Article—Scientists and others within the Space Sciences Directorate at GSFC will be able to log on to a secure site using a user ID and password to submit an article or link to an article they have found on the web. The Article Submittal webpage will look similar to the one shown in Figure 1 that was developed by three members of my administrative Branch at GSFC the Advanced Architectures and Automation Branch, Code 588, Walt Moleski, Larry Hull, and Rachel Campbell. They never wrote any papers on this technology and it only exists on an intranet at a single Branch at GSFC. However, their innovative ideas provided the beginnings of my idea to build the more extensive and more automated SciExchange for which I am very grateful. Our interface will differ in that authors will not only be able to cut and past articles but where possible they will only have to enter a link to the web page where the referred article resides, thus savings a great deal of time and memory in most cases. In other words, SciExchange will be a very distributed database with most of the source material residing at its original location on the web and only pointers to the material residing in the SciExchange database.

Search the database—Similar to the blue buttons in Figure 1, SciExchange will have buttons that bring up other windows and allow users to perform other tasks. One of these tasks is searching the SciExchange database of existing articles, reports and links to such material. Since the database is expected to grow exponentially as users enter links to new scientific material, these searches will be conducted with a powerful search tool called WebTheme [1] [2] that will be discussed later in the paper. It contains a very intuitive user interface and has found many converts within NASA, DOE, and other government agencies because of its ease of use and broad application.

Subscribe to Listserv—This function will allow the members of the Space Sciences Directorate at GSFC to subscribe to the SciExchange System and choose from a broad range of topics or key in their own keywords. These topics would be the ones they would be interested in receiving email notification about when new articles or links are entered into the SciExchange database.

The listserv function will also be a test-bed for software agents. For example a member of the Directorate in a meeting a could choose to send an agent off to harvest all peer reviewed journal articles published in the last month on a specific topic that is being discussed at the meeting. This will be possible through a laptop, GSFC's wireless intranet, and SciExchange.

Initiate Web Harvest—This function is the single most powerful aspect of SciExchange and as mentioned above this will be discussed below, though, there will be a button that takes you to the WebTheme user interface from the main SciExchange user interface.

Use WebTheme to Sort Textual Data Sets—This function will be initiated from the main SciExchange user interface and will allow users to use the WebTheme tool to sort large sets of textual material, such as emails about astrophysical phenomena or just sort their email period, by thematic content. They can then look at it with statistical data visualization tools that allow users to see the entire content of their email on a single visual display, without having to open up each individual email.

Open Software SQL Database

We just received funding to use an in-house Civil Servant software engineer to do the programming for SciExchange. The software engineer will come from GSFC's Information Systems Center. The choice of which database to use will be made in consultation with the software engineer. It will be an object oriented database and the particular choice will

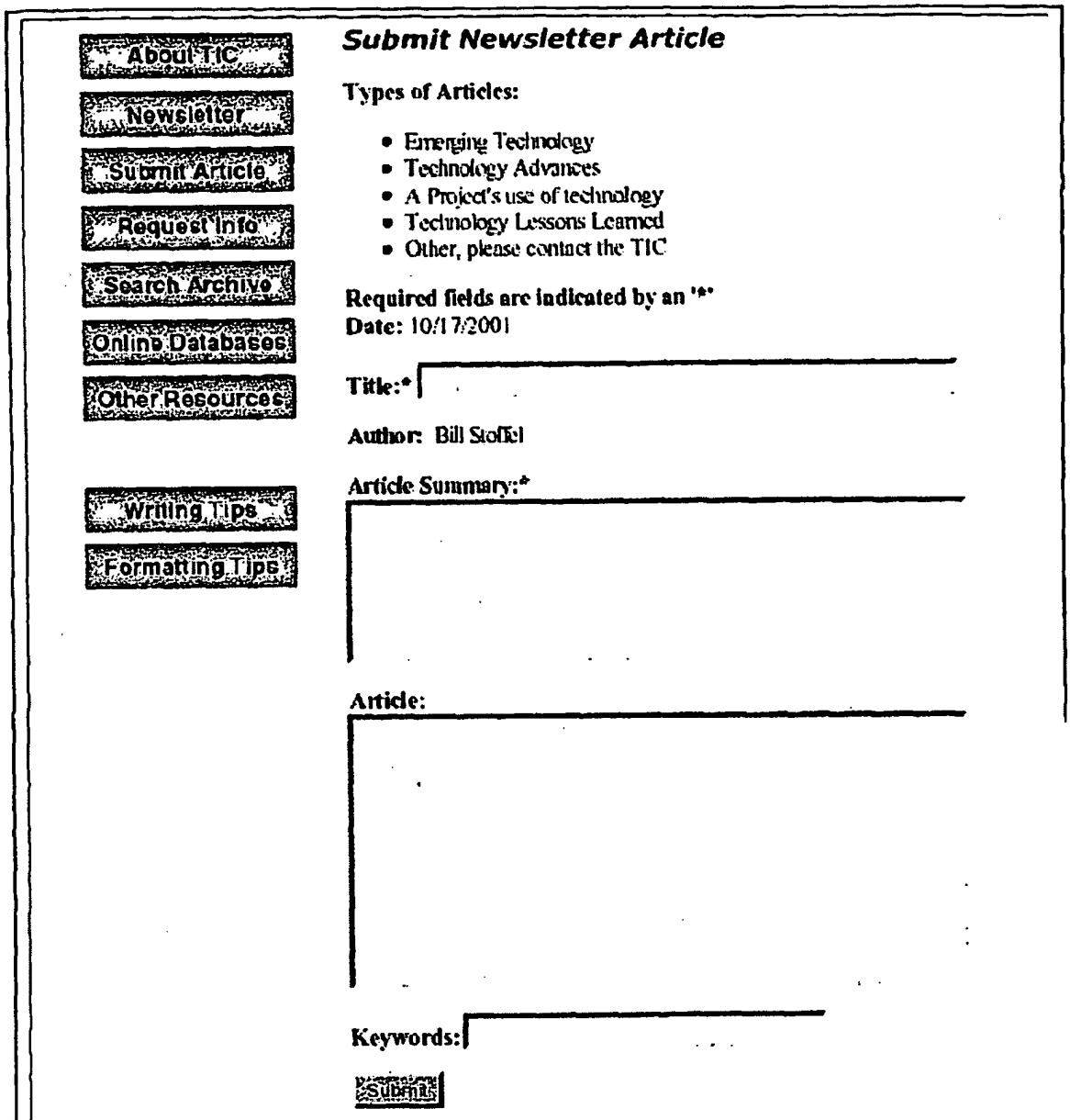

Figure 1 ~ SciExchange User Interface Submit Article Web Page Prototype

depend on a number of factors such as cost, ease of use, and the quality of tech-support.

WebTheme

WebTheme is the most powerful weapon in the SciExchange arsenal and it while it based on patented technology, it is still only in its infancy. WebTheme is a server based application that lets users enter a query string or an entire article, by cut and pasting, and then initiate a multi-threaded search of the WWW to retrieve, organize,

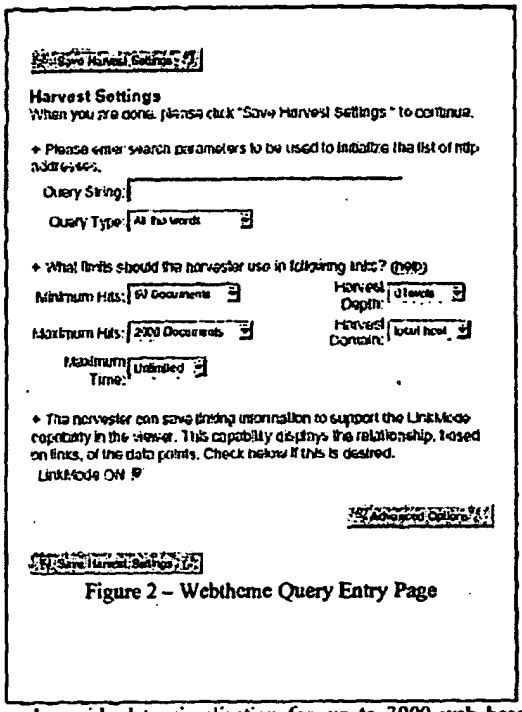

Figure 2 – Webtheme Query Entry Page

and provide data visualization for, up to 3000 web based documents, on any topic in about an hour. A screen shot of the query string entry page for WebTheme is shown in Figure 2. WebTheme extracts text from web-based documents, organizes the set of harvested documents according to key topics. WebTheme will present the set of harvested documents as a galaxy cluster display as in Figure 3, where each dot represents a

document and the proximity of one dot to another represents similarity of topics. Any article's title can be shown by shift-right-clicking on the dot representing that article and any article can be opened from within WebTheme itself by simply double clicking the left mouse button on the dot representing the article. The Orange Centroids tell the user what clusters of topics are located where and what topics have been harvested.

WebTheme uses standard statistical means to extract data from the thematic content of textual material. It uses primarily K Means to determine proximity once it has created scalar vectors from each document it has harvested. WebTheme works best with sets of between 2000 and 3000 documents. The WebTheme technology is a web based wrapper put around a much more powerful technology also developed by Pacific Northwest National Laboratories (PNNL) called SPIRE which just recently earned PNNL a U.S. Patent. We are adapting WebTheme to harvest any set of documents so we can apply its harvesting capability to email, literature searches of any kind, or any other textual material that the members of the Space Science Directorate at GSFC may choose.

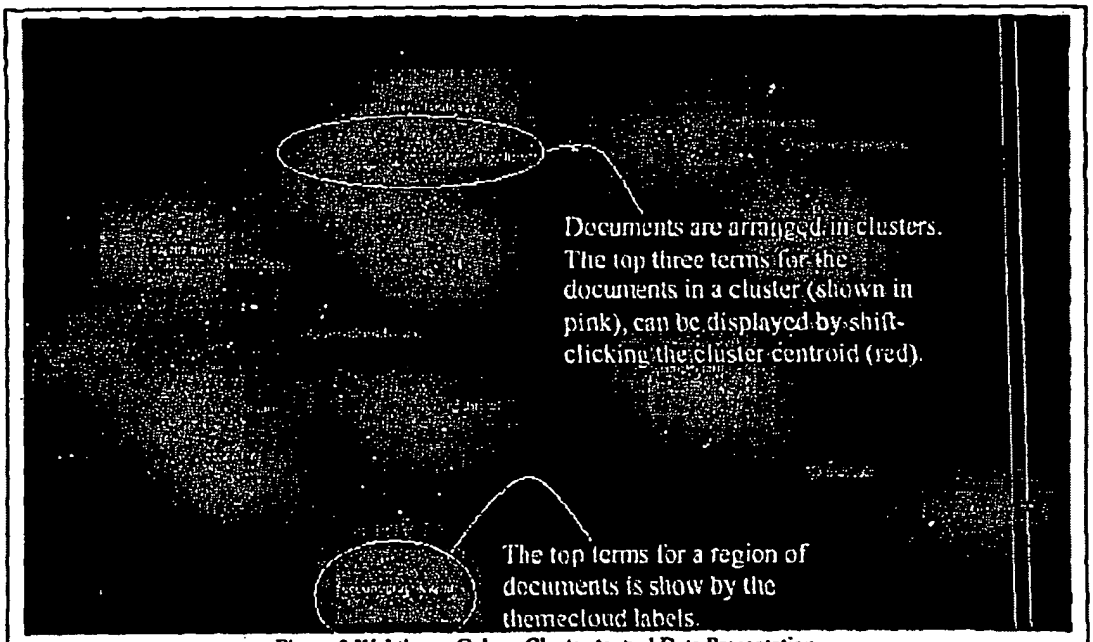

Figure 3 Webtheme Galaxy Cluster textual Data Presentation

Subscription Services

The Subscription Services will serve several functions in SciExchange. First, it will allow users to subscribe to listserv email and choose topics that they would like to be automatically notified about when new textual material is entered into the SciExchange database. Subscription Services will also be the central point that members of the Space Sciences Directorate at GSFC will use to launch a wide array of administrative, office assistant, research assistant, and other software agents that will be made available to them. SciExchange will be a test-bed as well as the application where we actually field these software agents. We will be using the large set of KQML based software agents developed by the Defense Advanced Research Projects Agency (DARPA) [3] [4] and which are available on the WWW. The agents have already been produced at taxpayer expense, many have undergone rigorous testing in military applications, and they easily lend themselves to use on the Internet and WWW.

The hope is that scientists will be able to initiate administrative tasks such as literature searches, prescreening of email for matters of urgency or other reasons, initiate travel orders, purchase requests and many other tasks while they are performing their daily duties even while they are in meetings using GSFC's wireless network and their laptops. These tasks can also be done over the Internet when users are off center but are logged in through broadband connections that are becoming quite common, at least in the Washington, D.C. area in recent years. All of the features will have to be tested and phased in over time, but in talking to many of my colleagues and in obtaining the funding for SciExchange, I have found there is a great deal of interest in reducing the number of administrative duties that they each have to perform and that interfere with actual scientific and engineering work.

3. Planned Uses and Implications

The primary use for the SciExchange system will be as a means of capturing and distributing new technical literature within the Space Sciences Directorate at GSFC. Almost of equal importance will be the ability of users to conduct literature searches of the entire web using WebTheme. If one combines the power of this harvesting tool with the number of subscription services to which GSFC's technical library and other government libraries subscribe, the potential for very fast, very thorough, literature searches is quite a leap forward from manual literature searches.

The ability to display and manipulate large quantities of textual material in a visually meaningful and graphical manner provides for the thematic content of textual material what has long been available for numerical data. It is hoped that this will greatly reduce the amount of information overload in the arena of textual material. We are hoping that the users themselves will find WebTheme useful and valuable as another research tool and that they will find new applications for WebTheme and SciExchange and thereby teach us new applications for SciExchange.

The implications for SciExchange are several. First it is expected to simplify and speed up the capture and distribution of scientific literature. Next it will greatly ease the burden of literature searches and allow harvest and meaningful displays of large quantities of textual material. Finally, it should reduce the amount of information overload on the users of the system as well as reducing the number of administrative tasks that they have to perform in a time consuming and manual way.

It is expected that after the Space Sciences Directorate at GSFC has used SciExchange, it will eventually be used by other organizations within GSFC as well.

4. Summary

In Summary SciExchange represents a great reduction in the level of information overload that the members of the Space Science Directorate at GSFC will experience. SciExchange also provides a very powerful tool for conducting literature searches through the use of WebTheme.

WebTheme is a very powerful tool and was developed at great expense to the taxpayer and it is the author's hope that someday something like it will reside at the website of the major search engines such as Yahoo and Google.

The use of agents to act as administrative assistants to users of SciExchange has long been a dream of many within the computer science community and now by starting with small individual tasks we will be able to realize that dream slowly but surely.

It is hoped that SciExchange will find a wider audience than just that within GSFC. The Authors also plan to expand on the system by building on SciExchange and WebTheme with proposals to conduct research with PNNL into handling the thematic content of longer documents and building on other work that PNNL is conducting.

The whole area of reducing information overload is an area fertile for further development.

References

[1] Pacific Northwest National Laboratories at http://www.pnl.gov/infoviz/technologies.html#webtheme/ and http://www.pnl.gov/infoviz/papers.html/.

[2] Beth Hetzler, Paul Whitney, Lou Martucci, Jim Thomas. Multi-faceted Insight Through Interoperable Visual Information Analysis Paradigms. In Proceedings of

IEEE Symposium on Information Visualization. InfoVis '98, October 19-20, 1998, Research Triangle Park, North Carolina. pp.137-144.

[3] KQML as an agent communication language Tim Finin, Yannis Labrou, and James Mayfield, in Jeff Bradshaw (Ed.), "Software Agents", MIT Press, Cambridge. to appear, (1997).

[4] Comments on the specification for FIPA '97 Agent Communication Language, Yannis Labrou and Tim Finin, University of Maryland, Baltimore County, Baltimore Maryland USA, February 28, 1997.

[5] http://www.cs.umbc.edu/kqml.html/.

[6] http://www-ksl.stanford.edu/knowledge-sharing/papers/kse-overview.html.

[7] http://agents.umbc.edu/.

[8]. http://www.fipa.org/.

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PACT — A Software Package to Manage Projects and Coordinate People

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Abstract

PACT is a software package that extends Microsoft Project by endowing it with extensive features needed to coordinate projects among distributed participants and manage their inter-dependencies. Significant features include:

- *support for multiple users*
- *comprehensive RDBMS to store project history and maintain strict access control*
- *common visibility of the project network to all team members, no matter where they are on a network*
- *direct involvement by participants in the coordination of the project*
- *practical metrics to assess projects, at the planning phase itself, using the most recent project data*
- *worklist queues to notify members of the project when changes occur*
- *attachment of the results of tasks to the tasks themselves for others to instantly obtain all the technical information needed to perform subsequent tasks; paperless working is thus made possible.*

1: Overview of Project Management

The Program Evaluation and Review Technique (PERT) is well understood and forms the core of most Project Management software packages. Its usefulness is underscored by the fact that many contractors who undertake projects, even if only for a portion of a much larger project, are expected to submit a PERT chart to validate their bids, and establish the baseline project performance (time and cost) they will be expected to achieve if they win the bid.

Microsoft Project™ is a standard planning, analysis, and management tool that lets you do project management based on PERT techniques. With it one may visualize the complex plans by splitting a project into manageable steps to see in detail how the tasks are related, which are most important to the overall schedule (i.e., lie on the critical path), where bottlenecks will be, and how much the whole project will cost. Several projects may be consolidated to assess shared resources and team workloads.

Built-in links to Microsoft Exchange make it easy to publish selected attributes of a project—such as when deliverables are due— and communicate the status of projects automatically. Various standard reports may be produced from a PERT package as post-mortems. These are guides for the manager. Future action will depend on what these reports show. One of the important insights of the PERT method is to highlight the set of critical activities that have to be watched with extra vigilance because any delay in these activities will delay the entire project.

1.1: New Realities of Project Management

The PERT technique, as it evolved in practice, relied for its control method entirely on the project manager and the 'chasers', people who expedite activities in the field by following up with numerous departments, contractors, and individuals on pending work and resource availability.

There are two new factors that change the picture for project management:

(a) Teams

Companies have taken to the idea of empowering teams of persons, representative of all the perspectives of the effort, to collaborate and perform the project themselves, using project and task leaders as experienced guides who will help to plan, decompose, and monitor the tasks.

Such teams are generally distributed over several locations, and sometimes even over several enterprises involving partners, sub-contractors, and sponsors. Distance always tends to slow down interaction among the project team members, hinder the sharing of important information, and muddle the actual status of the project.

But teamwork calls for early, rapid, and continual communication, preferably in a structured fashion. It is also important for complex projects to preserve the memory of past communications, since significant knowledge can be lost in the chatter of frequent exchanges.

(b) Speed

Time is recognized as the most important of the three cardinal variables in projects: time, cost and delivered quality. Intense competition in the marketplace has impelled com-

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parties to react fast, develop and introduce products in shorter time cycles, and provide rapid customization of products to individual customer tastes and requirements.

These two factors can be combined into an important requirement for project management: it must take place in real time, and involve every member of the project.

1.2: Aspects of Project Management

Conventional project control is based on a computer representation of the PERT network of tasks [1]. The updating of the network by task completion events yields status reports for managers to view the progress. The classical approach provided centralized control over the project with updating at periodic intervals. Advances in computer technology (communications and the client-server paradigm) and the ubiquitous presence of micro-computers has made it possible now to knit the working members of the project into a tightly coordinated team. The new project software complements the classical batched methods with client-server software that enables the dispersed team members to participate directly in the project activities from their workplaces as events unfold. The idea is to use networking and computer technologies to break down the barriers of time and place between people and information, between managers and the people they need to work with.

In this paper we will describe one such software called PACT (Project Assessment and Coordination for Teams) that attempts to marry project management with groupware. It extends considerably the scope of a single-user commercial software, MS Project [2], meant to be used primarily as a planning and progress charting tool by the project manager. PACT is a multi-user system that keeps the team members constantly aware of each other's activities, and maintains a strong thread of project communication among them.

2: The Design

We decided not to implement the whole of the project management software *ab initio*, but to rely instead on a popular project package to provide the gamut of visual interfaces needed to manipulate the project network. This decision enabled a more rapid exploration to be done on ways to satisfy the new requirements without getting mired in the implementation of all that is standard and valuable in classical PERT methods. At the same time it pointed up the precise deficiencies of the older generation of software.

The design is based on using the single-user MS Project software as the front end. The back-end was built using a commercial client-server data base management package, Oracle™ 7 [3], to store the project network. This made the project representation used by MS Project redundant, but in the spirit of using what was available and extending it, we made sure that every change made to the MS Project network was propagated right away to the Oracle project data base. Oracle has the immense advantage that it supports SQL transactions over a wide variety of distributed networks using a module called SQL*Net™. Using SQL*Net makes it possible for team members to collaborate on projects via PACT from their workstations anywhere in the world, so long as they have some network connectivity, via TCP/IP, for example.

The project data base contains many elements, besides, that are not represented in the MS Project network file. An example is the data base of all those in the company who compose the team for a particular project; each member of the team comes from a special discipline and plays a unique role in the project. Additional data elements are needed to support communications among the team members, and the maintain the entire project history from the beginning, accessible on-line to team members.

2.1: Task Breakdown

The tasks themselves have a hierarchical structure so that the task decomposition may be done over time as the project advances and the team members proceed to work at lower levels of detail on the tasks. In a large and uncertain project the entire project task network from beginning to end is not specified to the same level of detail all at once. The project is usually sketched at a high level only and it is decomposed further, as the occasion demands, for a finite period in the future. Furthermore, the decomposition may be delegated to someone else by the project leader.

The data base supports the assignment of responsibility for tasks to individuals. The assignees may then work on their tasks and though they can see all the tasks everyone is working on, they may only update their own tasks by the act of completion. The 'ownership' of a task and the responsibility to complete it are unambiguous and cannot be delegated; however, the work can be handed down. The only persons who can assign tasks are the project leader, and designated sub-project leaders.

2.2: Communication

To support communication concerning the project (as opposed to e-mail about sundry subjects) the project data base has tables to store Questions and Answers, categorized by task. Though a question can be asked about anything pertaining to the project, special provision exists to structure questions along the lines of Who, What, When, Why, Where, and How (the 5W1H format, as we call it). The importance of keeping these questions and answers in the data base is that they are then remembered and form a continuous record of the project-related communication that can be referred to at any time in the future. They store the aspect of project history relating to communications.

2.3: Project History

Storing the history is considered very important in projects concerned with product development. What takes place (or does not take place) has to be a verifiable record so that it may be entered into the patent record, in case future patent applications emerge from the work. Much product development work also needs to be a certified record of design calculations made, tests done, trade-offs considered, and so forth. These documents validate the design and ensure that safety, reliability, environmental hazards, and other design perspectives are evaluated properly and recorded. The storing of project history is also necessary in order to benefit from past experience in the management of future projects. ISO 9000 quality certification would also mandate the type of project documentation PACT enables.

The project history should be stored directly with the project tasks for greatest relevance and ease of access. Storing them in a separate document repository, without connecting them to the tasks in the graphical interface, makes for a pile of documents without an understandable structure or context. Therefore the project database also has fields in the Task table to store the actual documents that are input (needed to perform the task) and output (resulting from the performance of the task). Another aspect of project history that is maintained in the data base is the record of all project assessments made.

2.4: Coordination

The use of the word Coordination in the title of this paper is deliberate. Too much of the past emphasis in project management has been on Management, which is a top-down view of how a project is conducted. It gives the impression that projects are master-minded by a powerful manager who sits atop the hierarchy and gets things done by delegating to others and then reviewing the whole work single-handedly.

In reality, the power of reviewing projects is vastly improved by connecting the groups of workers horizontally to each other and endowing the project with a measure of transparency so that those who need to know are kept informed. They should see the progress and the results of work by other team members that have a bearing on their own work. They themselves become inspectors, reviewers, and interrogators of the project in the most pointed way. Of course, the project leader and leaders of the sub-projects at lower levels do need special tools, but the objective of the software is Coordination among people engaged in the tasks, rather than Control or Management of the entire project by one person.

In a general sense Coordination is brought about by Communication. A powerful communication infrastructure should therefore be the foundation of effective project coordination. PACT does have such a layer and a communication interface is built into the software, enabling any worker to notify anyone else or ask questions related to tasks. Putting the communications interface into the Tasks window places Questions, Answers, and Notifications right where they belong, in one uniform commonly visible window.

But coordination is more than just communication. Coordination is enhanced when the responsible workers get to know about the completion of tasks on which they are dependent. PACT does this through an interface called the Worklist Window. It displays the specific tasks that require his/her action because all precedent tasks have finished. Similarly, all Questions directed to his attention appear in the same window.

Therefore, without the use of any human chasers, each project team member gets to know what are the pending work items, in order of priority. In PACT a protocol calls for an assigned task to be acknowledged by the recipient, stating the expected completion time, before the work is started. This allows others to plan their own work using that knowledge. It is an important advance over the system of chasers who are expected to run about all over the place to learn about the problems and expected completion times. Using PACT the project manager gets the most realistic input at any time as to when a work item will be completed, from those who are going to be engaged in the actual work. This is more authentic than going by the expected task duration and expected start date.

The Coordination facility of PACT goes even deeper than coordination based on tasks completion. Coordination extends to making available the data resulting from tasks to those who need it, and giving access to the data from the same Tasks interface that project workers are accustomed to. When a Task is completed, if there are any data resulting from it that must be preserved and used by other workers on subsequent tasks, then such data can be stored in native format files and attached to certain fields in the Task table in the data base. These data are then automatically accessible by any other worker in a subsequent task who has need for it.

This scheme has many advantages. For one thing, it does away with paper as a means of conveying detailed data or complex instructions from one person, task, or place to another. And because it is stored in a data base it does not get lost and is available to as many people as need it at the same time, right away without delay.

Coordination is pervasive in PACT. It is not done by one person, the project manager, but is a part of everyone's function. Coordination is not centralized and episodic; it is distributed and continuous. Coordination is done in a timely way, more or less automatically, self-managed by the team. In this sense PACT has many of the features of the Project Coordination Board, prototyped at the Concur-

rent Engineering Research Center (CERC) by Londoño [4] as part of the DICE project.

2.5: Project Assessment

One of the hardest things to do for a project manager is to answer the qualitative question: how well is the project coming along? Time and cost are two of the most common dimensions of project 'wellness'. Project management systems therefore have tracking functions to gauge the time and cost metrics. These are available as single summary numbers comparing the current expected completion date with the target completion date, and to-date accumulated cost with the budgeted cost for the completed tasks. The metrics can also be broken down into a variety of exception reports that help a manager pinpoint what has gone wrong.

Such standard time and cost metrics are available in PACT through MS Project, the base software. But PACT goes beyond these metrics and provides some unique management tools that are useful to project leaders in the real world. These practical tools help evaluate a project and its component sub-projects and tasks, from five additional perspectives:

1. Understandability

The first metric looks at the questions that have been raised by others regarding a task and whether they have been answered satisfactorily. The ratio of questions answered satisfactorily to questions raised regarding a task is taken as a measure of Understandability. Colors on a Gantt chart of Understandability are assigned as follows: green - 1.0, yellow >0.50, and red < 0.50.

2. Precision

The second metric is Precision of task definition. The task duration and duration of sub-tasks of the task are averaged to form a measure of whether the task has been broken down to a sufficiently fine granularity to be called a precise task. The implication is that unless task performance is known to a sufficient level of detail, there will be uncertainty about the task's completion. Colors on a Gantt chart of Precision are typically assigned as follows based on the averaged task duration: green - all sub-tasks < 2 days, yellow - some sub-tasks > 2 days, and red - all sub-tasks > 2 days. The level of granularity can be adjusted.

3. Realism

The third metric is Realism. We call a project realistic if people have been assigned to all tasks due to start in some relatively short (user-settable) time horizon, and a few other (programmable) conditions are also met. The notion is that projects must have their most important resource, people, identified and assigned well in advance, and the people themselves made aware of the forthcoming tasks they are expected to perform. If not, the project cannot be realistically expected to achieve its goal in time. Colors on a Gantt chart of Realism are assigned as follows based on a time horizon set by default at 1 month: green - persons assigned to every sub-task, yellow - persons not assigned to some sub-tasks, and red - persons not assigned to any sub-task.

4. Delay

The fourth metric is Delay, which arises when tasks meant to start or end before today have not done so. This metric is particularly indicative of trouble if the tasks are on the critical path. Colors on a Gantt chart of Delay have this significance: green - all tasks scheduled to start or end before today have done so, yellow - some tasks scheduled to start or end before today have not done so, and red - no task scheduled to start or end before today has done so.

5. Risk

The fifth metric is Risk. Certain sub-projects may have risks identified in advance or fundamental design issues raised regarding their performance; these are considered risky sub-projects, whose risk can be tracked by setting up certain milestones to gauge the evolution of risk over time on the path to completion. The progress on successive milestones is tabulated to give a Risk metric. There is a reduction whenever a milestone is attained, but it increments to a higher value if a suite of tasks has to be repeated. The Risk metric is 1.0 at the start for identified risky tasks or sub-projects; assuming the entire risk will be tracked by the achievement of n milestones, it decrements by $1/n$ for each milestone achieved.

All the metrics can be evaluated for single tasks, for sub-projects containing several tasks, or for the entire project. The metric values are propagated upward according to reasonable rules. The display of these metrics as colors in Gantt charts provides a very useful qualitative view for managers. They may wish to assess the Understandability metric of the project tasks, for instance, and are then shown a Gantt chart in which the perfectly understandable tasks (all questions satisfactorily answered) are shown as green, those with over half the questions answered are shown yellow, and those with less are shown as red. Such a chart with gray-scale substituting for color is shown on the next page.

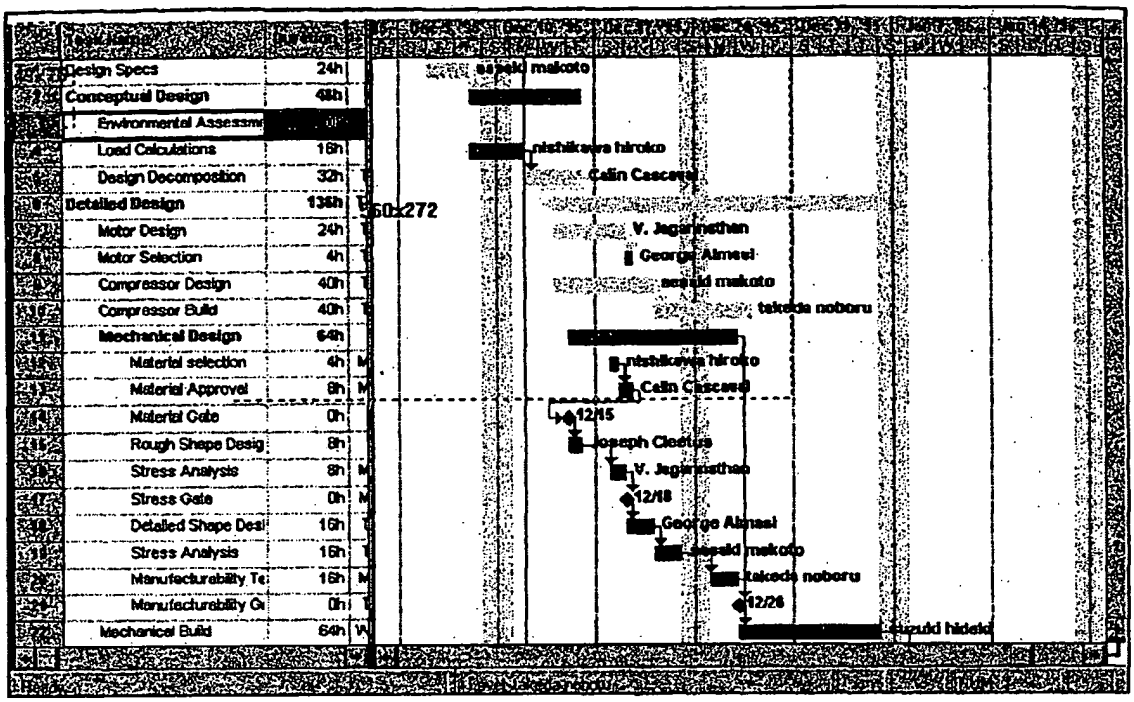

Figure 1: Qualitative Depiction of Metrics by Colors of Tasks

Taken together these metrics provide practical ways of assessing projects before they go wrong. They are not high level post-mortem metrics like cost and time that only present the bottom line assessment. Rather, the five metrics constitute a set of assessments which point out what needs fixing ahead of time, during the task planning phase itself, to ensure good results in the end. In the rest of this paper we will describe some additional features of PACT that make it an ideal tool for coordinating people, sharing data, and assessing the state of a project.

2.6: Distributed Teams

PACT maintains a data base of persons in the organization with their departmental affiliations, specializations, and some private personnel data, visible only to some managers and project leaders. A team can be set up for a project by selecting persons from the organization to be included in the team pool. It is from this team that the assignment of persons to tasks is done by the project leader. Common privileges are made available to the team members, e.g., visibility of the project activities and communication. Thereafter, team members use PACT from their desktops, both to record their own work and to obtain all necessary information from other tasks in the project. Thus, PACT serves as an all-embracing Project Coordination Board.

2.7: Multiple Projects

Any person may belong to several project teams and can participate from his/her desktop and view the activities of others in the project. Any number of projects may be opened by a person, and switching between different projects is done by a simple menu selection.

2.8: Security

What a person can view and what a person can change in a project is strictly controlled by proper data base permissions. Only members of a project can open and view the activities of the project. Only the project leader can induct a new member into a project. Within a project no task attributes may be changed by a team member except those of a task assigned to that person; and among those attributes too, only a few may be changed, those which indicate task completion and point to reference documents.

2.9: Project Progress views

Views are provided for managers at different levels to see the progress of a project. A top level bird's eye view enables managers to examine multiple projects and subprojects in summary fashion. A next lower level view is confined to a single project and shows the progress in tasks, relative to the baseline plan, as a graphical Gantt

chart with colors to indicate delays, if any, with respect to the baseline plan. A manager may also view the future progress as it would evolve from the present situation, were no further delays to occur.

2.10: Data Sharing

Specific task parameters are assigned for storing document files. These can be used for conveying the all-important inputs required for performing tasks, as well as the results from tasks, in the form of document files produced by arbitrary applications. Therefore, in a product development project, both the Product data as well as the Project data can be conveyed through a single interface and shared quite usefully among the team members. Double clicking these task parameters will bring up the original application and display the information in the technical documents, if the user has the application installed on his desktop.

2.11: Accountability and Responsibility

A person in the project is assigned to a task and becomes responsible for it when a leader or a proxy assigns the task to her. The person's name is shown beside the task. She may co-opt others but remains the responsible person. However, her task completion has to be checked and approved by the person who assigned the task. Questions regarding the task are directed to the person responsible for the task, though others may also comment.

2.12: Automated Worklist

Every person sees a To-Do Worklist. Whenever new tasks are assigned to her, or tasks previously assigned become ready for work, or when questions are asked relating to tasks for which she is responsible, an item appears in the worklist. Double-clicking on the item shows the details of the item.

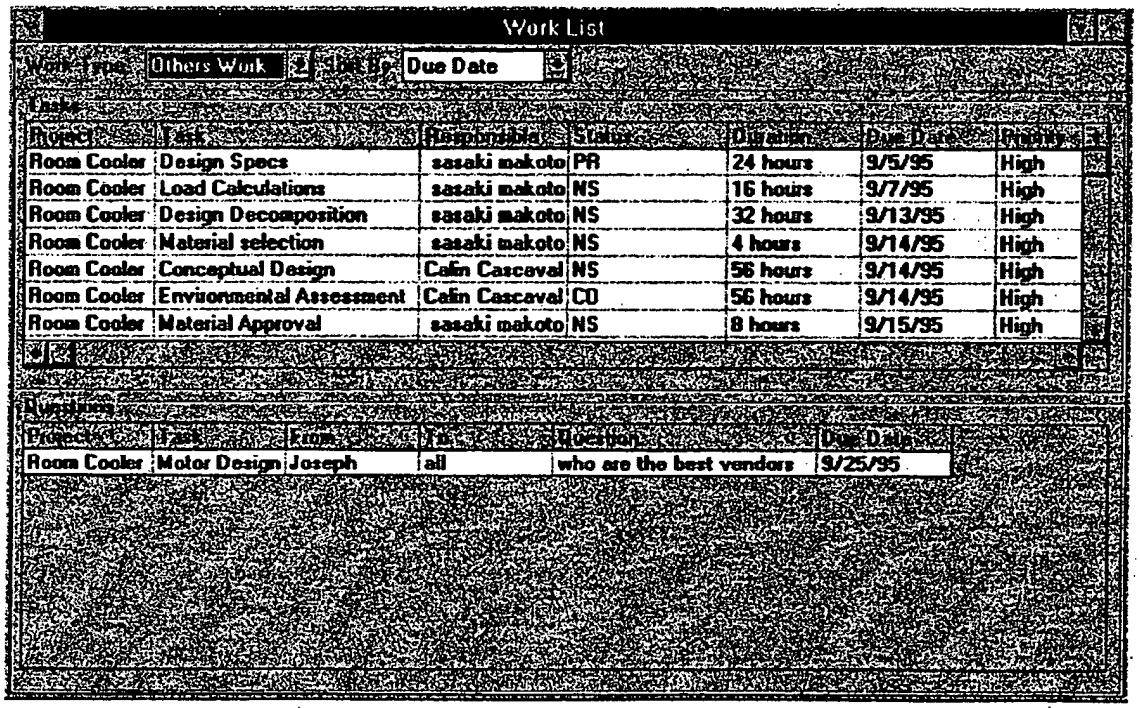

Figure 2: Display of Worklist and Notifications

2.13: Group Decision System (GDS)

This is an optional add-on module [5] for problem resolution, discussion, and trade-off negotiation. It merits a separate description, but a brief account is as follows. The GDS software module provides a graphical interface for developing a discussion in the public view of the participants. A Problem announced by a discussion leader is the starting point; it must have one or more Customer criteria. Starting from there participants propose various Solutions. Solutions may be buttressed by supporting Arguments or rebutted by contra Arguments. Evidence can be adduced for any argument. All these entities can have multimedia at-

tachments, including sound and graphics. Finally, a Voting procedure enables the group to arrive at the best solution, based on the measure of satisfaction of the customer criteria, using the participants' own estimates.

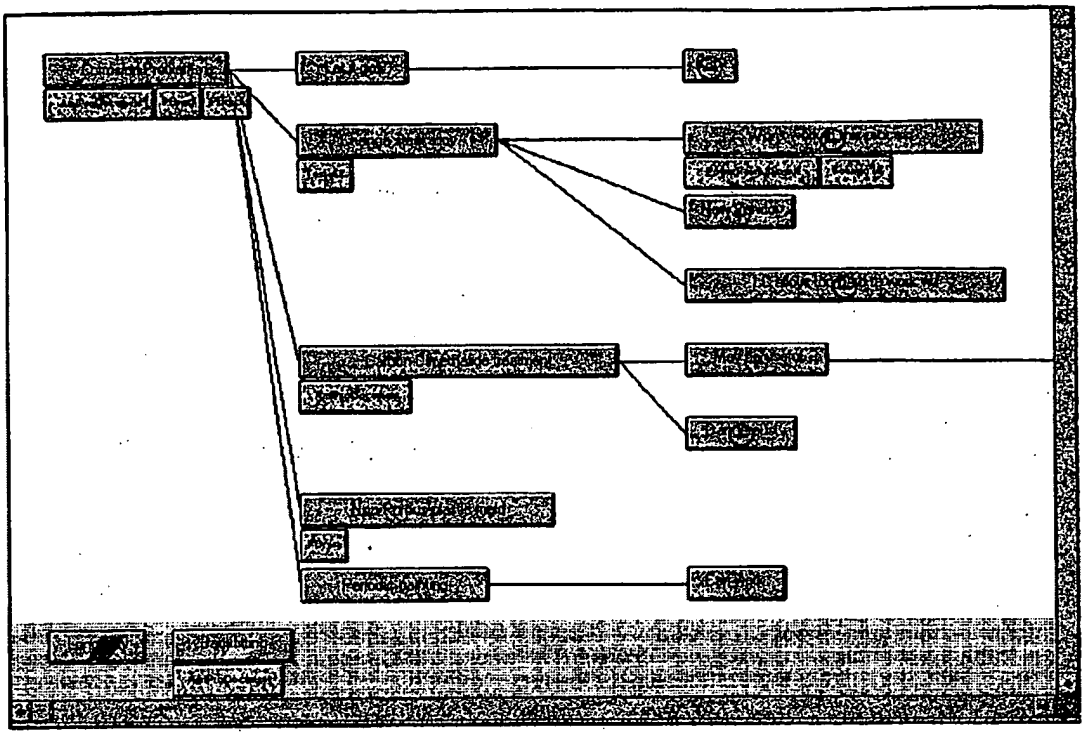

Figure 3: Main screen of a well-developed discussion in the optional GDS Module

2.14: Multimedia Support

Attributes of many of the entities allow multimedia attachments; therefore a very natural and detailed project interaction is possible. Drawings can be attached as task <input parameter>. Results of tasks may again appear as graphical documents in the task <results parameter>. Questions, for example, may be asked through a voice attachment; answers too may include voice and graphics.

2.15: Common Visibility across the Team

The theme of the software is full team viewing of all that concerns the team. The team may be distributed anywhere on the Internet or a private network. Nevertheless, everyone will see the full picture of the project, so far as security permissions governing the team work will allow.

3: Why do projects fail?

Management analysts who have studied past projects to discover the causes of failure cite some important reasons:

- lack of a well-understood common goal
- lack of a detailed understandable work plan
- lack of communication
- lack of transparency
- lack of measurement and follow-up
- lack of understanding by each person of his role.

The feature set offered in PACT addresses these causes of failure. PACT not only aids the project leader, but even more important, it makes the project come alive for those who work on the tasks. Common visibility of the project and rapid communication is emphasized. Project management, instead of being top-down only, can be up-down and sideways, thanks to the opportunities given in PACT to know what has happened or will happen in the project, and communicate the concerns of everyone.

It is predicted that management by projects will become the new general management. Project management will sweep aside traditional functional line management, and organizations will adopt flat, flexible structures oriented to work processes and projects, rather than toward departments and specializations. Whether the newer style of

management becomes pervasive or not, it is abundantly clear that project management itself cannot continue in a classic top-down manner with batched information collection and reporting. It must become increasingly distributed, devolving responsibility to the team entrusted with achieving the goal, and communicating vital notifications rapidly.

Individual workers and sub-project leaders will have to assume responsibility, and they must be given the means to assess, communicate, work, and propagate the results to others in real time without the hold-up of paper passing and face-to-face meetings. These are the central themes of PACT, and enable it to function as the essential tool for distributed team coordination.

The application domain of PACT is quite general by design. Software projects, civil construction projects, and product development projects can all be conducted with its help.

4: Features Comparison between a Common Project Management System and PACT

PACT, being based on Microsoft Project, has all its capabilities and accompanying graphical user interface, so that it can handle any of the common functions required of a Project Management System. But PACT has significant capabilities, beyond what other systems provide. These may be summarized in the following chart:

Feature	Common Project Management Systems	PACT
No. of users	1	Multiple
Distributed	No	Client-Server
Security and Privacy	No	Yes
Project History	No	Yes
Metrics	Time & Cost	Time, Cost, plus 5 more
Task Communication	No	Yes
Worklist	No	Yes
Group Decision Support	No	Yes

5: Future Work

An important element that we plan to add in future releases is a set of project/process templates, so that companies can reuse their previous project experience.

We have stated before why MS Project was chosen as the foundation to build this new generation of project management software. We needed only to exploit the user interface to display and interact with the task network. However, because the user interface manipulation is separated from the underlying data base, it was impossible to make the data base permissions evident at the user interface itself. Therefore, a new user interface, or a better integrated MS Project user interface, is another future goal.

6: References

[1] Lowery, Gwen. *Managing Projects with Microsoft Project: Version 4.0 for Windows and the Macintosh.* Van Nostrand Reinhold. 1994.

[2] Microsoft Project User's Manual

[3] Oracle 7 Manual

[4] Londoño, F., Cleetus, K.J., and Reddy, Y.V. *A Blackboard Scheme for Cooperative Problem Solving by Human Experts.* In Computer Aided Cooperative Product Development (Eds.) Sriram, D. Logcher, R., and Fukuda, S. Springer Verlag. 1991.

[5] Cleetus, K.J. and Almasi, G. *GDS: A Group Decision Support System.* Proceedings of the Fifth Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises, June 1996. IEEE Computer Society Press.

[6] http://www.pmi.org/pmi/catalog.htm A Web site that has numerous links to documents about project management.